Weekly Review 6_0910

1) Let f be a continuous, differentiable, and monotonic function on the domain [3, 8]. The table shows four function values of f.

x	3	4	6	7
$f(x)$	-4	1	5	8

Which of the following statements must be true? Explain your choice.

I. $f(8) > 9$

II. $f'(5) > 0$

III. $f'(c) = 3$ for exactly one c in [3, 7]

(A) II only (B) II and III only (C) III only

(D) I and III only (E) I, II, III (F) None of these

2) Let g be a function defined and continuous on the closed interval $[a, b]$. If g has a local minimum at c where $a < c < b$, which of the following statements must be true? Explain your choice.

I. If $g'(c)$ exists, then $g'(c) = 0$

II. $g(c) < g(b)$

III. g is monotonic on $[a, b]$

(A) I only (B) II only (C) III only

(D) I and II only (E) I and III only (F) None of these

Problems #3 – 5 can be solved using algebra alone, but I want you to solve them using calculus.

3) A rectangle is inscribed under the graph of $h(x) = 9 - x^2$ and above the x-axis. Find the maximum possible area for that rectangle.

4) An open-topped box with a square base must be constructed with a volume of 12 cubic inches. What dimensions use the least amount of material? (*Hint:* Define your variables for dimensions of the box. Now write two equations, one for volume and one for surface area. Which one will be optimized?)

5) From an 8 inch by 10 inch rectangular sheet of paper, square of equal size will be cut from each corner. The flaps will then be folded up to form an open-topped box. Find the maximum possible volume of the box.

Answers to Weekly Review 6

1) (B)

2) (A)

3) A = $12\sqrt{3}$

4) $2\sqrt[3]{3}$ *by* $2\sqrt[3]{3}$ *by* $\sqrt[3]{3}$

5) about 52.5 in^3